**3GPP TSG-RAN WG4 Meeting #94-e R4-20xxxxx**

**Electronic Meeting, Feb.24th – Mar.6th 2020**

**Agenda item:** 8.5.1

**Source:** Huawei

**Title:** Email discussion summary for RAN4#94e\_#80\_NR\_IAB\_System\_parameters

**Document for:** Information

# Introduction

This topic area deals with the system parameters for IAB, this includes the general sections of the TS as well as the frequency and channel arrangements.

The discussion on the specification drafting methodology is necessarily discussed in this topic area also – although it will be applied to all spec drafting.

There is some overlap between topic areas particularly in the area of the BS class definitions and the TX output power, it has been decided to treat this issue in the “RAN4#94e\_#82\_NR\_IAB\_RF\_Tx” subject area a 3 papers have been moved to that discussion group.

The subjects in this discussion area have been separated into 3 topics:

* + TS Drafting and referencing
  + TS Drafting – General section (Clause 4)
  + TS Drafting - Operating bands and channel arrangement (clause 5)

# Topic #1: TS Drafting and referencing

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2002123 | Qualcomm | WF on IAB TS spec structure and terminology |
| R4-2002043 | Huawei | Discussion on drafting TS and referencing  **Observation 1:** If specific referencing is used CR’s to incorporate updates in the donor/referenced documents are needed for those updates to be applied. |

## Open issues summary

The level of referencing to donor BS and UE specification still under discussion.

### Sub-topic 1-1

WF (R4-2002123) was drafted between meetings, R4-2002043 provides more background on problems associated with specific referencing.

**Issue 1-1: TBA**

* Proposals
  + Option 1: Referencing
    - If the requirements of an IAB-DU are same as those of a gNB, 38.174 may refer to the corresponding sections of gNB specs. Additional text will be added to highlight the differences from the source specs.
    - If the requirements of an IAB-MT are same as those of a UE, 38.174 may refer to the corresponding sections of UE specs. Additional text will be added to highlight the differences from the source specs.
  + Option 2: Self contained
  + Good readability without thinking hard how to write good “delta” info text.
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 1-1: support option 1 and lots of requirement for IAB DU and IAB MT is just copy&paste just replace the term NR BS or UE by NR IAB DU or NR IAB MT. |
| CATT | Sub topic 1-1: We’re just beginning to follow this topic. So we don’t have very clear view on this. But looking at what’re discussing in this meeting, there’re many requirements which may not copy exactly UE or BS requirements. Then considering this, we think it’s not just copy or self-contained. There will be some specific requirements for IAB. We support option 2. It’ll be clearer. |
| Samsung | Sub topic 1-1: it should be not separated 2 options there. We agree to have reference approach as much as possible at least for most of the IAB-DU requirements of which BS requirement could be applied. But for those requirements could not refer to BS or UE simply, they definitely should be discussed case by case. |
| Ericsson | Sub topic 1-1: option 2 is preferred. Related to this, how to maintain the IAB spec should also be discussed. Our opinion is that the IAB spec need to be evaluated anyway even if reference approach is chosen. So we cannot save future work in this aspect. If so, should the good readability should be targeted as there are terminology difference in IAB context. How to write the “delta” text for the reference approach also not too clear. |
| Nokia, Nokia Shanghai Bell | Sub topic 1-1: Generally, referencing the sections when the requirements are the same guarantees that the updates to UE/BS specifications are propagating to IAB-specifications in a timely manner without the need of additional CRs and simultaneously avoiding the risk of diverging specifications. Therefore, option 1 is preferred in case the requirements are the same.  Referencing should not be used in case the requirements differ or there is a risk that updates in the source specification will not be applicable for IAB-Nodes. Therefore, we see that referencing would be applicable mainly to IAB-DU requirements and system parameters. |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: TS Drafting – General section (Clause 4)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001902 | Ericsson | TP to TS 38.174: subclause 3.1, Definitions |
| R4-2002044 | Huawei | TP to TS 38.174, clause 4 |
| R4-2001901 | Ericsson | TP to TS 38.174, subclasue 4.3, Conducted and radiated requirement reference points |
| R4-2001852 | Ericsson | TP to TS38.174, subclasue 4.7.1 Applicability of signaling characteristics related RRM requirements |
| R4-2001887 | Ericsson | TP to TR, subclause 4.2, RF Requirements reference points |
| R4-2001888 | Ericsson | TP to TR, subclause 4.1, Spec organization/ Relation with other core specification |
|  |  |  |

## Open issues summary

TPs include text for the general section in clause 4 and some definitions in clause 3

### Sub-topic 2-1 – subclause 3.1 - definitions

A number of TP’s to the TS contain definitions of terms used in those TP’s, R4-2001902 however contains 4 definitions for UL and DL

**Issue 2-1: TBA**

* Proposals
  + Agree proposed definitions
* Recommended WF
  + TBA

### Sub-topic 2-2 – subclause 4.1, 4.2

Text in R4-2002044, contains text for subclause 41. “Relationship with other core specifications” and subclause 4.2 “Relationship between minimum requirements and test requirements”

R4-2001888 is text for the TR on “Relation with other core specification” which provides more detail.

**Issue 2-1: TBA**

* Proposals
  + Accept TP to TS 38.174 for subclauses 4.1,4.2
  + Accept TP to TR 38.xxx for subclauses 4.1
* Recommended WF
  + TBA

### Sub-topic 2-3 – Subclause 4.3

Very similar (identical?) updates in R4-2002044 and R4-2001901.

Note both offer a generic IAB type 1-H, 1-O or 2-O architecture definition, they do not differentiate between IAB-DU and IAB-MT.

R4-2001887 is aTP to the TR on the same subject with background.

**Issue 2-2: TBA**

* Proposals
  + Agree TP for subclause 4.3
* Recommended WF
  + TBA

### Sub-topic 2-4 – Subclause 4.4

R4-2002044 updates BS classes subclause, this subject along with 3 papers (R4-2001868, R4-2001886 and R4-2001903) have been moved to RAN4#94e\_#82\_NR\_IAB\_RF\_Tx as the subject is linked to the Tx output power discussion

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 2-1: prefer to define the IAB definition as package and some suggestions are added  IAB MT uplink: It is used by the IAB MT for transmitting signals to parent IAB node.  IAB DU uplink: It is used by the IAB DU for receiving signals from child IAB MT or legacy NR UE.  IAB MT downlink: It is used by the IAB MT for receiving signals from parent IAB node.  IAB DU Downlink: It is used by the IAB DU for transmitting signals to child IAB MT or legacy NR UE.  Sub topic 2-2:for sub-clause 4.1 and 4.2, I think that most of parts are fine, but test confromance spec is not ready, maybe we could wait for a while for spec numbering.  Sub topic 2-3: the following secion might have applicability problem when it applied to IAB MT, as MIMO layer for uplink is limited compared with DL. For Downlink, 12 layer for MU-MIMO and 8 layer for SU-MIMO and only 4 layer for uplink regardless of MU-MIMO or SU-MIMO.  For an *IAB type 1-O* the transceiver unit array must contain at least 8 transmitter units and at least 8 receiver units. Transmitter units and receiver units may be combined into transceiver units. The transmitter/receiver units have the ability to transmit/receive parallel independent modulated symbol streams. |
| CATT | Sub topic 2-1: We don’t have strong opinion on this. But I have some clarification question. I don’t know how to use these 4 definitions. I looked at RAN2 running CR, there’re some definitions. IAB MT and IAB DU are named as “IAB-MT” and “IAB-DU”. And there’re no specific IAB downlink and uplink definition in the RAN2 CR. To my understanding, there’s no confusion on the uplink and downlink understanding in IAB scenario. But if all of you think it’s necessary, then I’m ok.  Sub topic 2-2~2-4: Some editorial comments for both R4-2002044 and R4-2001888. “IAB\_DU” should be “IAB-DU”? And the same with “IAB\_MT” |
| Samsung | Sub topic 2-1: please note that the upstream link of IAB could be parent IAB and donor gNB. And downstream link of IAB could be child IAB and UE. It is proposed that the definition can be included with the understanding on how and where to use them in specification.  Sub topic 2-2/2-3/3-4: in R4-2002044 there is definition on MT class, not sure whether it can be agreed as it is as mentioned in summary. And there is no agreement on how to handle conformance testing specification for IAB. It may be premature to include them now or at least [] should be put on them. For R4-2001887, further checking needed, it was discussed in last year backhaul link and access link are not suggested to be applied for IAB, which may bring ambiguity since there exist both CH BH and parent BH. And for NR BS RF it states as “IAB DU shall reuse the relevant requirements from spec in TS 38.104 and no new requirement will be developed for IAB DU” this may be too arbitrary statement. And it is suggested to be refined as “IAB DU will reuse the relevant requirements from spec in TS 38.104 where applicable” |
| Ericsson | Sub topic 2-1: ok with proposal. The definition is related to the general description of the channel bandwidth, there is a need to clarify uplink and downlink for IAB DU and IAB MT.  “The *BS channel bandwidth* supports a single NR RF carrier in the uplink or downlink at the Base Station”  “The UE channel bandwidth supports a single NR RF carrier in the uplink or downlink at the UE.”  Sub topic 2-2: for 4.1, we need add what is IAB, suggest to add “IAB (Integrated Access and backhaul) is an evolved Base station equipped with wireless backhaul functionality.”  For 4.2, we need more understanding on test spec of IAB before make decision.  Sub topic 2-3: For 4.3. Agree.  Sub-topic 2-4: For 4.4, two comments on R4-2002044  1. As IAB has different type not DU or MT, suggest changing IAB DU Type 1-O or 2-O to IAB type 1-O or 2-o  2. we are not sure on different DU class and MT class, we believe MT and DU should be same class in R16, for different class DU and MT on the same IAB node, we need more study for that. |
| Nokia, Nokia Shanghai Bell | Sub topic 2-1: It is unclear which definitions exactly are proposed to be agreed. At the moment we do not see it necessary to define the terms proposed in R4-2001902. In the proposed definitions in R4-2002044 we suggest to revise term “RIB” to “RIB(s)” as this would better reflect that IAB-MT and IAB-DU are not mandated to share the same RIB. It has not been agreed yet whether MT and DU have one requirement set or whether there are 2 requirement sets, and therefore the definitions should be updated to use “requirement set(s)”.  It seems R4-2001888 is also defining new terms “RAT NR BS” and “RAN NR UE” though this is not taking place in definitions section. These definitions are not needed.  Sub topic 2-2: TP to TR in R4-2001888 is not yet at the quality level to be accepted. It is not good to state “IAB compliant to 38.174 is by default compliant to 38.104” as it is unclear whether IAB-DU or IAB-MT or both are meant and also in case of self-contained specification 38.104 and IAB-DU part of 38.174 may diverge by accident. It is not correct to state “RF spec relevant to wireless backhaul is quoted with IAB-MT requirement” as also IAB-DU will operate in wireless backhaul. Unclear why TR 38.803 is referenced when FR1 range was revised after creation of 38.803. The definitions at the end are not needed as commented in sub-topic 2-1.  Additionally, the spoken language like “spec” should be cleaned up and terms IAB-Node, IAB-DU and IAB-MT should be used consistently to avoid possibilities for misunderstandings.  Sub topic 2-3: These comments are based on the understanding that the TP is proposed to be agreed to the TS. Change marks in R4-2001901 are not correct. Both TPs imply that IAB-MT and IAB-DU share the same interface, which may not be the case. This should be taken into account in the revision. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: TS Drafting - Operating bands and channel arrangement (clause 5)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000824 | Huawei Technologies Co.,Ltd. | FR1 IAB frequency band  **Proposal:** IAB node should support band n77 and n78 |
| R4-2000974 | ZTE | Discussion on IAB MT channel bandwidth  **Proposal:** send one clarification LS to RAN2 on declaration of IAB MT supported channel bandwidth. |
| R4-2000275 | Samsung | TP for TS38.174, clause 5, IAB system parameters |
| R4-2002045 | Huawei | TP to TS 38.174, clause 5, Operating bands and channel arrangement |
| R4-2001186 | Ericsson | On multicarrier and CA for IAB  **Observation 1:** It is possible that the IAB-MT and IAB-DU may operate on different carriers/bands simultaneously.  **Observation 2:** In case the IAB-DU and IAB-MT are implemented on the same radio hardware, it would be desirable to have a single set of RF and demodulation requirements for CA/multi-carrier.  **Observation 3:** The IAB specification should be forward compatible considering simultaneous TX/RX. The specifications should not preclude that for rel-17 the same panel may simultaneously transmit/receive IAB-MT CA and IAB-DU CA or multicarrier, and so should set requirements accordingly.  **Observation 4:** There is no need for the IAB-MT specification to preclude using CA combinations that are not defined for UEs (at least for the “wide area / planned” class).  **Observation 5:** If the BS approach to CA and multicarrier requirements is adopted, then there is no need to make a list of CA / multicarrier combinations in the IAB specification.  **Proposal 1:** For the “wide area/planned” IAB class, CA and multi-carrier requirements use the BS approach  **Proposal 2:** RAN4 should discuss and conclude whether the BS approach is also feasible for the “local area / unplanned” IAB class |

## Open issues summary

A proposal to add band n77 and n78 to the FR1 operating bands list

A proposal to send a clarification LS to RAN2

2 contributions which import and update text describing the operating bands and channel arrangement.

### Sub-topic 3-1 -Adding bands n77 and n78

Support by operators: China Telecom, China Unicom, BT plc

**Issue 3-1: Adding bands n77 and n78**

* Proposals
  + Option 1: Approve proposal
* Recommended WF
  + TBA

### Sub-topic 3-2 – Clarification LS to RAN2

Propose a clarification LS to RAN2 on declaration of IAB MT supported channel BW

**Issue 3-2: LS to RAN2**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

### Sub-topic 3-3 – TP to TR 38.174

The 2 TP’s cover the same section, some clear differences are:

* The transformation of *BS channel bandwidth* and *UE channel bandwidth* from the donor specs has been handle differently in the 2 TP’s
* R42000275 – Uses references in 5.3.1, 5.3.2, 5.3.3, 5.3.4, 5.4 - This issue to be discussed in sub-topic 1-1

**Issue 3-3: TS text to TS 38.174 clause 5**

* Proposals
  + Revise text of one of the TP’s based on result of sub-topic 1-1
* Recommended WF
  + TBA

### Sub-topic 3-4 – Multi-carrier and CA for IAB

R4-2001186 proposes using the BS approach for multi-carrier and CA.

The proposals have some reliance on the class definitions

**Issue 3-4: Multi-carrier and CA for IAB**

* Proposals
  + Proposal-1: Only study the IAB MT and IAB DU belong to the same class scenario.
  + Proposal-2: Assume that wide area and medium range IABs are planned and local area IABs are unplanned.
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 3-1: support band n77 and n78 for IAB operation  Sub topic 3-2: support to send one clarification LS back to RAN2  Sub topic 3-3: Note 2 in section 5.3.5 should be removed as this 30MHz is late request from operators from R15 I think, so it is only applied for BS side without UE side. In addition, some system parameter for intra-band contiguous CA or intra-band non-contiguous CA is different ,we need to pay attention on that.  Sub topic 3-4: okay for proposal 1 and proposal 2. |
| CATT | Sub topic 3-1: we support it.  Sub topic 3-2: We discussed with our RAN2 colleague, we’re not clear what’s the understanding problem with the LS sent last meeting.Sub topic 3-4: Agree with Samsung’s comment. MT class is not decided yet. |
| Samsung | Sub topic 3-1: fine with option 1.  Sub topic 3-2: it seems the LS sent last meeting has already delivered corresponding information. Need to check RAN2 status on how to implement RAN4 LS before agree on this LS.  Sub topic 3-3: for system parameter, except IAB channel bandwidth, the reference way should be applied.  Sub topic 3-4: this relies on MT classification discussion. Need to agree on MT classification first. |
| Ericsson | Sub topic 3-1: ok with option 1.  Sub topic 3-2: LS sent last meeting by QC should cover this LS, is there anything more then last sent LS?  Sub topic 3-3: we support the revised text , not support the reference, the channel bandwidth is a little complex , that is why we define IAB DU uplink and IAB DU downlink, IAB MT uplink and IAB MT downlink.  Sub Topic 3-4: The intention of our paper here is not to discuss IAB class definition (that is in another thread), but to discuss whether the IAB should be based on multicarrier BS like requirements or the UE CA framework. We argue that at least for the large cell/planned, BS multi-carrier requirements work best. We also think that the BS/multi-carrier requirements work for the other class of IABs, but would be interested if there are other views. Here though let’s discuss how to implement multi-carrier and carrier-aggregation, not the class definition. |
| Nokia, Nokia Shanghai Bell | Sub-topic 3-3: Proposal to revise after decision in referencing has been done sounds reasonable. Here some aspects to take into account once the revision is done: In R4-2002045 the term “BS channel bandwidth” is still used in section 5.3.3 and both section 5.3A.1 and 5.3A.2 talk about transmission bandwidth configuration for CA. The benefits of using the suffix A are not clear.  In R4-2000275 the notes in definitions section are more applicable to be placed in the actual requirement section. There is typo in band n41 frequency range.    Sub-topic 3-4: It is ok to apply BS approach meaning that IAB-Node declares it CA capabilities and individual configurations are not listed in 38.174. However, it is RAN2 domain to define how the link is configured.  The class specific proposals should be decided on after the class definition in discussion #82 has a conclusion. At the moment we do not see the motivation to mandate IAB-MT and IAB-DU to be always the same class as at this point it has not been decided which classes apply to IAB-MT. This shall be discussed in the email discussion #82. In proposal-2 it is unclear if the wide area and medium range IAB refer to DU class or some potential MT class. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |